

# PROJECT facts

DEPARTMENT OF ENERGY  
OFFICE OF FOSSIL ENERGY  
FEDERAL ENERGY TECHNOLOGY CENTER

ADVANCED CLEAN/EFFICIENT  
**POWER systems**

PS014.0697

## HIGH-PERFORMANCE POWER SYSTEM FOR THE 21ST CENTURY

### Project Description

United Technologies Research Center is leading a team of companies in developing an innovative, clean, and efficient coal-fired power plant for the 21st century. The High Performance Power System (HIPPS) is based on an indirectly fired cycle that uses a high-efficiency gas turbine. The combustion process heats a “working fluid” (air) that drives the turbine.

The HIPPS will have a thermal efficiency of 47% or greater—today’s coal-fired power plants range from 33% to 35%. The system can use a clean fuel, such as natural gas, to further increase efficiency. Higher efficiency significantly reduces greenhouse gases, since less fuel is burned to produce power, and reduces consumers’ electricity costs.

Additionally, the system can potentially reduce air emissions levels to one-tenth the level today’s Federal standards allow, while creating marketable by-products in place of solid waste (saving disposal expenses).

During Phase I, which has been completed, the team produced a conceptual design after analyzing various alternatives to determine technical risk and economic feasibility. Key activities in Phase II will be to generate experimental data for subsystems, conduct engineering and economic analyses, and design the prototype plant. At the end of Phase II, one of the two teams in the HIPPS program will be selected to proceed to Phase III, construction and operation of a prototype plant.

### Program Goal

The U.S. Department of Energy’s strategic plan aims to reduce any adverse environmental impacts associated with energy production, delivery, and use. The HIPPS program’s objective is to achieve significant increases in thermodynamic efficiency of electric-power generation. Through increased efficiency, all airborne emissions can be decreased, including carbon dioxide emissions. Moreover, higher efficiency yields environmental benefits throughout the entire fuel cycle, including coal mining and transportation, reducing solid waste, water requirements, and thermal loadings to bodies of water.

### PRIMARY PROJECT PARTNERS

**United Technologies  
Research Center**  
East Hartford, CT

### MAIN SITE

**East Hartford, CT**

### TOTAL ESTIMATED COST

**\$42,544,000**

### COST SHARING

**DOE \$35,058,000**

**Non-DOE \$7,486,000**

## Project Benefits

## Daniel Seery

**Lawrence A. Ruth**

## Project Partners

Salt Lake City, UT  
(combustor design)

- Increase electric-generating efficiency to 47% or more.
- Lower emissions of sulfur and nitrogen pollutants to less than a tenth of the levels current U.S. new-plant standards allow, and meet or exceed the strictest world standards for overall environmental performance of coal-fired plants.
- Reduce greenhouse gas emissions, specifically carbon dioxide, by as much as 30% in the first commercial plants and, as technology matures, by more than 35% overall.
- Produce electricity at costs at least 10% below those of today's plants.
- Repower existing coal-fired plants, significantly increasing operating efficiency.

## (Dollars in Millions)

## Private Sector Partners

Prior Investment	FY95	FY96	FY97	Future Funds**
\$5.9	\$3.6	\$4.9	\$3.8	\$16.7
—	\$0.9	\$1.2	\$1.0	\$4.4

\* Appropriated Funding

\*\* DOE and non-DOE Partners will contribute an additional \$50 million each during Phase III.

## Key Milestones

[illegible]